V22B-5 1430h

Oxygen Isotope Variations of Lavas from the Ongoing Puu Oo Eruption of Kilauea Volcano

M O Garcia ; A Pietruszka (Univ. of Hawaii, Honolulu, HI 96822; ph. 808-956-6641; e-mail: garcia@soest.hawaii.edu); E Ito (Univ. of Minn., Minneapolis, MN 55455;; J Eiler (Caltech, Pasadena, CA 91125;

Previous oxygen isotope work on Hawaiian tholeiitic lavas has shown substantial variations for fresh lavas and glass ($\delta^{18}O$ = 4.6-5.7; Kyser et al.1982; Garcia et al. 1989), which were interpreted to reflect isotopic differences between mantle sources. To better understand the cause of O isotope variation in these rocks, we analyzed lavas from the Puu Oo eruption. Pristine glasses from this 12 year old, east rift zone eruption of Kilauea show the same wide O isotopic range. This is quite remarkable given that the O isotope range for most MORB glasses is only 5.7 per mil (Ito et al. 1987). Glasses from the early part of the Puu Oo eruption, a period when mixed magmas were erupted, have the lowest ratios ($\delta^{18}O$ = 4.6-4.8). The glass O isotope value increased 0.5 per mil following a shift in the vent location to 3 km downrift and the eruption style changed from episodic to continuous. During this continuous phase of activity, the oxygen isotope value of the Puu Oo glasses gradually decreased 0.2 per mil over the next two years and has remained nearly constant for the last 5 years, except for a sample taken just after a collapse of the Puu Oo cone into its shallow magma reservoir; it is 0.7 per mil higher. In contrast to the large variations in glass O isotope values, olivines from these lavas have remained nearly constant ($\delta^{18}O = 4.8 \pm 0.1$). Thus, the O isotope variations in the glass formed after the growth of the olivines. These results indicate that crustal processes are involved in modifying O isotope values. The low O isotope values in the early mixed lavas probably reflect contamination of rift zone stored magma by assimilation of hydrothermally altered crust (Kilauea hydrothermal fluids have low O isotope values, <0). The high ratio in the late lava ($\delta^{18}O$ = 5.7) may be related to assimilation of the vapor altered, Puu Oo cone material. Our results indicate that caution should used when interpreting O isotope values, even for pristine, relatively mafic lavas (7-10 wt% MgO).